

SECTION 15020 - PIPE SUPPORTS

City of San Diego, CWP Guidelines

PART 1 – GENERAL

1.1 WORK OF THIS SECTION

- A. The WORK of this Section includes providing pipe supports, hangers, guides, and anchors.

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.
 - 1. Section 05500 Miscellaneous Metalwork
 - 2. Section 15000 Piping Components

1.3 SPECIFICATIONS AND STANDARDS

- A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:
 - 1. ANSI/ASME B31.1 Power Piping
 - 2. ANSI/MSS SP-58 Standard Pipe Support Components

1.4 SHOP DRAWINGS AND SAMPLES

- A. Submittals shall comply with Section 01300 and Section 15000 and shall include:
 - 1. Shop drawings of pipe supports including details of concrete inserts.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. General: Piping systems including connections to equipment shall be properly supported to prevent deflection and stresses. Supports shall comply with ANSI/ASME B31.1, except as otherwise indicated.
- B. **ANSI/MSS Types:** Except as otherwise indicated, pipe support components shall comply with the types in ANSI/MSS SP-58.
- C. Support **Spacing:** Supports for horizontal piping shall be properly spaced. Except as otherwise indicated, pipe support spacing shall comply with the following:

1. Support Spacing for Schedule 40 & 80 Steel Pipe:

Pipe Size inches	Max. Span feet
1/2	6
3/4 & 1	8
1-1/4 to 2	10
3	12
4	14
6	17
8 & 10	19
12 & 14	23
16 & 18	25
20 & Above	30

2. Support Spacing for Copper Tubing:

Tube Size inches	Max. Span feet
1/2 to 1-1/2	6
2 to 4	10
6 & Above	12

3. Support Spacing for Schedule 80 PVC Pipe:

Pipe Size inches	Max Span (@ 100 degrees F) feet
1/2	4
3/4	4
1	5
1-1/4	5
1-1/2	5
2	6
3	7
4	8
6	10
8	11
10	12
12	13

4. Support Spacing for Schedule 80 Polypropylene Pipe:

Pipe Size inches	Max Span (@ 100 degrees F) feet
1/2	3

3/4	3
1	3
1-1/4	4
1-1/2	4
2	4
3	5
4	6
6	7
8	8
10	8
12	9

5. Support Spacing for Fiberglass Reinforced Plastic Pipe:

Pipe Size inches	Max. Span (@ 100 degrees F) feet
2	8
3	10
4	11
6	12
8	13
10	14
12	15
14	16
16	17
18 & Above	18

6. Support Spacing for Welded, Fabricated Steel Pipe:

Practical Safe Spans for Simply Supported Pipe in
120-deg Contact Saddles

Nominal Size in.	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
	Wall Thickness-in Span, L-ft									
24	33	37	40	43	45	47				
26	33	37	41	43	45	47				
28	33	38	41	44	46	48				
30	34	38	41	44	47	49				
32	34	38	42	45	47	50				
34	34	38	42	45	48	50				
36	34	39	42	45	48	50	54			
38	34	39	43	46	48	51	55			
40	34	39	42	46	49	51	55			
42	35	39	43	46	49	52	56			
45		39	43	47	50	52	56			
48		40	44	47	50	53	57	61		
51		40	44	47	50	53	58	61		

54	40	44	47	51	53	58	62		
57	40	44	48	51	54	58	62		
60	40	44	48	51	54	59	63	66	69
63	40	44	48	51	54	59	63	67	70
66	40	45	48	52	54	59	64	67	71
72	41	45	49	52	55	60	64	68	72
78	41	45	49	52	55	61	65	69	72
84	41	45	49	53	56	61	66	70	73
90	41	45	49	53	56	61	66	70	74
96	41	46	50	53	56	62	67	71	75

For steel pipe sizes not indicated, the support spacing shall be designed to ensure that the stress on the pipe does not exceed 5,000 psi calculated from the following formula:

$$L = \frac{7500tD}{32t + D}$$

t = thickness, in.
 D = Diameter, in.
 L = Safe span, ft.

Maximum deflection of pipe shall be limited to 1/360th of the span.

7. Support Spacing for Ductile Iron Pipe:

<u>Pipe Size</u>	<u>Max. Span</u>
All Sizes	2 Supports per length or 10 feet (One of the 2 supports located at joint)

8. Variances: For temperatures other than ambient temperatures and for other piping materials or wall thicknesses, the above spacings shall be modified in accordance with the pipe manufacturer's recommendations.

9. Additional Supports: Additional supports complying with ANSI B31.1 shall be provided at critical elbows, valves, gauges, and meters.

D. **Pipe Hangers:** Pipe hangers shall be capable of supporting the pipe, shall allow for free expansion and contraction of the piping, and shall prevent excessive stress on equipment. Hangers shall have a means of vertical adjustment after erection. Hangers shall be designed so that they cannot become disengaged by any movement of the pipe. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves, shall include hydraulic shock suppressors. All hanger rods shall be subject to tensile loading, only.

E. **Hangers Subject to Horizontal Movements:** At hanger locations where lateral or axial movement is indicated, suitable linkage shall be provided to permit movement. Where horizontal pipe movement is greater than 1/2-inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from minimum to maximum temperature, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

F. **Spring-Type Hangers:** Spring-type pipe hangers shall be provided for piping where vibration or vertical expansion and contraction is indicated, (engine exhausts and similar piping). Spring-type hangers shall be sized to the manufacturer's printed recommendations and the loading conditions indicated. Variable spring supports shall be provided with means to limit

misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate at all times the compression of the spring. Supports shall be designed for a maximum variation of 25 percent for the total travel resulting from thermal movement.

- G. **Thermal Expansion:** Wherever expansion and contraction of piping is indicated, a sufficient number of expansion loops or joints shall be provided, with rolling or sliding supports, anchors, guides, pivots, and restraints. They shall permit the piping to expand and contract freely in directions away from the anchored points and shall be structurally suitable to withstand all loads imposed.
- H. **Heat Transmission:** Supports, hangers, anchors, and guides shall be designed and insulated so that excessive heat shall not be transmitted to the structure or to other equipment.
- I. **Riser Supports:** Risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.
- J. **Freestanding Piping:** Free-standing pipe connections to equipment, including chemical feeders and pumps, shall be firmly attached to fabricated steel frames made of angles, channels, or I-beams anchored to the structure. Exterior, free-standing overhead piping shall be supported on fabricated pipe stands, consisting of pipe columns anchored to concrete footings, with horizontal, welded steel angles and U-bolts or clamps installed to secure piping.
- K. **Submerged Supports:** Submerged piping shall be supported with hangers, brackets, clips, or fabricated supports and stainless steel anchors complying with Section 05500.
- L. **Point Loads:** Meters, valves, heavy equipment, and other point loads on PVC, fiberglass, and other plastic pipes, shall be supported on both sides according to manufacturer's recommendations to avoid pipe stresses. Supports on plastic and fiberglass piping shall be equipped with extra wide pipe saddles or galvanized steel shields.
- M. **Noise Reduction:** To reduce transmission of noise in piping systems, copper tubes shall be wrapped with a 2-inch wide strip of rubber fabric at each pipe support, bracket, clip, and hanger.
- N. **Structural Design:** Pipe supports, anchors, and restrainers shall be designed for static, dynamic, wind, and seismic loads. The horizontal seismic design force shall be the greater of that indicated in the project Geotechnical Report or the requirement of the UBC for Seismic Zone 4.

2.2 COATING

- A. **Galvanizing:** Fabricated pipe products, except stainless steel or non-ferrous supports, shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM 123.
- B. **Other Coatings:** Other than stainless steel or non-ferrous supports, supports shall be coated in accordance with Section 09800.

2.3 MANUFACTURERS

- A. Pipe supports shall be manufactured by one of the following (or equal):

Basic Engineers
Bergen-Paterson Corp.
ITT-Grinnell Corp.
NPS Industries, Inc.
Powerstrut
Unistrut

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. **General:** Pipe supports, hangers, brackets, anchors, guides, and inserts shall be installed in accordance with the manufacturer's installation instructions and ANSI/ASME B31.1.
- B. **Appearance:** Supports and hangers shall be installed to produce an orderly, neat piping system. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings as possible and without interference with other work.

** END OF SECTION **